# SPE 112118

# Pace and Scale Deployment of a Real-Time Information System

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## Abstract

This Paper will describe in detail the process by which a newly developed real time information system was deployed at pace and scale to the Upstream community of a major integrated oil company. The primary focus will be a case study which demonstrates how an application can be successfully deployed across a wide range of cultures in order to bring standardization to the way real time data is accessed and used to generate value.

The ISIS (Integrated Surveillance Information System) program, developed by BP, provides distinctive real time well surveillance functionality. Delivering value from this technology development depends critically on successful deployment at a global scale.

This paper describes the Deployment Model used to guide such a full scale deployment program. Important pieces of background information will be presented first, followed by a review of the model and a description of its use.

Prior to full scale deployment of the final ISIS product, early beta versions were deployed. Learnings from these early deployments provided the basis upon which the final model was built. A review of lessons from these early efforts identifies potential pit falls and defines the elements of the final Deployment Model that are critical to an effective program.

This model has been applied to deploy ISIS to more than 20 fields spread over several regions worldwide, including amongst others, the UKCS, Gulf of Mexico, and West Africa.

## Introduction

In 2001, BP began to investigate how to best utilize emerging digital technologies in the upstream business, leading to the development of the FIELD OF THE FUTURE concept (Reddick et al, 2006, and 2008).

Real time data had been available for some time, but advances in digital capability (bandwidth, storage capacity, processing speed) indicated a step change was needed to fully utilize this technology. A review of the external market indicated a lack of development in the area of real time well surveillance.

As a result, BP embarked on a program to develop tools that could take full advantage of these technologies. From 2003-2005 prototype versions of the ISIS (Integrated Surveillance Information System) tool were developed and deployed for testing. Feedback from these early deployment efforts was critical in both the final development of the ISIS product, and refinement of the Deployment Process.

In 2006, a stable product version of ISIS was released, and this tool is now the BP standard for real time remote surveillance of wells and associated facilities. Development continues to add further functionality and enhancements as a series of programmed upgrades.

Following an introductory description of ISIS to aid understanding, this paper will focus on the deployment activity,

## Background Information

***ISIS Functionality:***

Base ISIS functionality consists of real-time continuous data processing for information relevant to well surveillance (Foot, 2006), including:

- Data Management and Cleansing
- Event Detection with Associated Notification: identification of changes of state based on real time data, and customized end user notification of changes;
- Data Visualization: Topography (well schematics, flowlines, separators) and Trending (all sensor data).

The system is designed and architected to allow additional functionality and analytic capability, delivering more derived data, to be added in a "plug and play" fashion. A number of such calculation modules are in use or under development.

***ISIS Technology Enables:***

- Continuous 24/7 real-time access to well and facility digitally acquired sensor data;
- Real time well performance monitoring of Pressure, Temperature and other real time sensor data through the entire flowpath;
- More information to define intervention / optimisation plans;
- Improved efficiency of well monitoring and reaction to events through customized alerts
- Indications of potential integrity problems;
- Well performance understanding through enhanced data visualization.
- Faster and integrated operational decision making ;

## Developing an Approach to Deploying ISIS Technology

The first versions of the ISIS tool were available in 2003. In order to test these early beta versions they had to be deployed to a working asset. The selection of this asset was important from a deployment perspective since it provided an opportunity to identify and resolve issues that might impact the future global deployment.

A UKCS asset was selected for the beta testing, due to the presence of the following characteristics:

- An appropriate range of instrumented wells and facilities;
- Suitable data managements and communications systems;
- Engineering staff with a high level of competency in the key technical areas impacted by ISIS;
- Management Support.

Experience gained from this initial deployment, plus related tests in a small number of other assets, led to an understanding of the key features required for deploying ISIS at wider scale.

1) Communications with asset staff and in particular the engineering team who would be using the technology are critical to achieving buy-in and take-up.
2) The degree of customization to connect the technology to a specific asset was determined. Additional development work was then undertaken to ensure the final productized version was efficiently configurable to the variety of assets present in BP.
3) Field Engineers expected the deployment team to complete modifications to the ISIS code to accommodate their specific requirements. This was allowed during beta test so that findings were fed back into the product, and this allowed refinement of the enhancements and modifications process for the final product.
4) Reusable procedures were developed for the design and configuration of the application to match the specific engineering details of the asset.
5) Deployment needed to include adequate user training and support with the initial set-up and early use of ISIS to establish the new capabilities.
6) Integration of the ISIS system with existing Process Control Networks (PCN's), data systems and corporate networks must be done in a way that is both stable and secure. Therefore a close collaboration with BP's IT organization was established to ensure compliance with architecture and security standards.

## ISIS Deployment Model - Description

One of the key benefits from the early deployments was identification of the key components of a successful deployment model. By early 2006 a model had been constructed using these learnings from the previous 3 years of activity. The deployment project requires closely aligned IT and Engineering staff and components. This is supported by business engagement and communications and followed by Business Transformation (see paper Feineman) and Technical Support offerings geared to delivering value through embedding utilization and process change. A detailed set of procedures has been established for each phase of the model, allowing consistent replication in each deployment undertaken.

The deployment model is structured as follows:

- Business Engagement and Communications
- Pre-Installation
- Installation
- Post Installation
- Long Term Support

Figure 1 illustrates the relationship of the model elements to the overall context of technology development, deployment, value realization and resourcing.

We now discuss each of the model elements in turn. Figure 2 illustrates the main activities associated with each element.

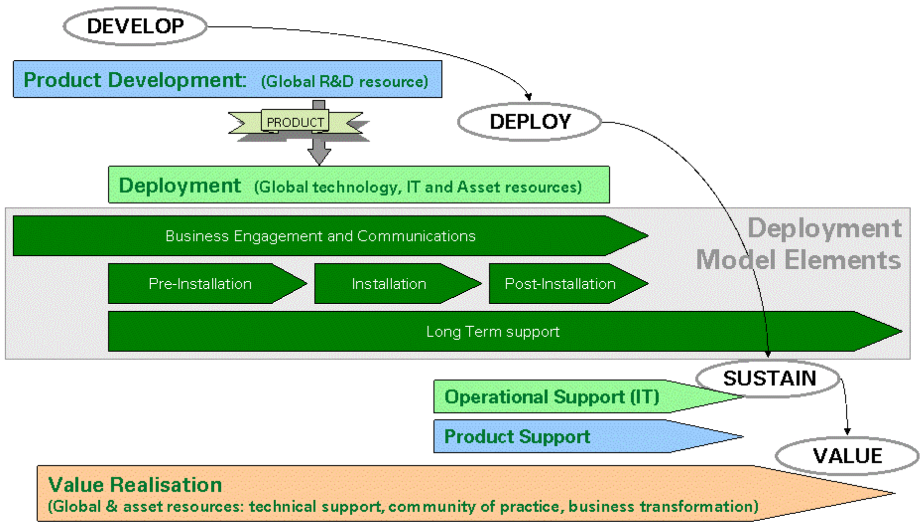


Figure 1: Deployment Model Elements in context of a complete technology development and delivery cycle

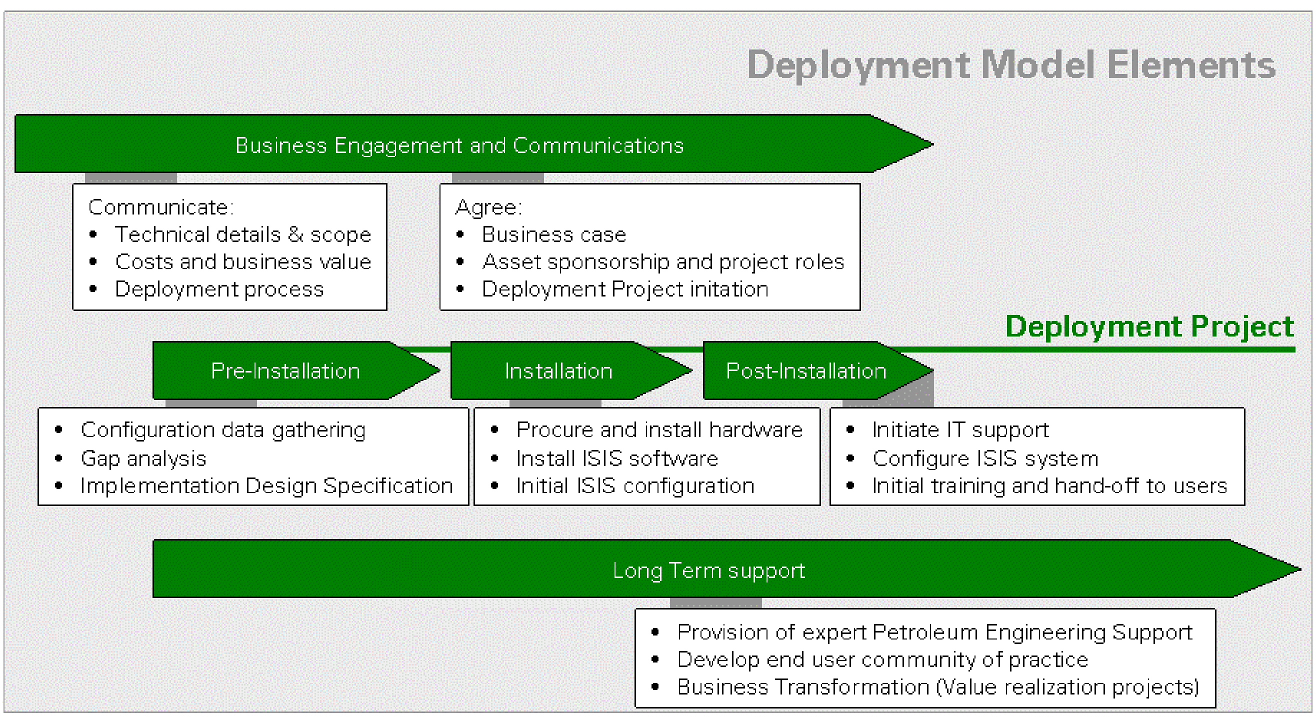


Figure 2: Key Activities associated with each of the Deployment Model Elements

<u>Business Engagement and Communications</u> - This is the critical first step in the deployment process. A cohesive and comprehensive set of communications material is required, including the following:

- General information for the multiple stakeholders impacted by the deployment activity, covering:
  - technical details and scope
  - costs and business value
  - deployment project process
- Training material – classroom and reference

Asset Engagement takes place through a series of meetings and workshops with key stakeholders in order to:

- Identify, document and approve the business case for deployment;
- Establish clear sponsorship and deployment project roles;
- Define, agree and initiate the deployment project.

<u>Pre-Installation</u> - This is all work required prior to the actual installation and configuration of the ISIS code on the servers, and includes the following:

- Configuration data collection
- GAP Analysis – Identifies gaps between ISIS functionality and what can be delivered to the asset based on their level of instrumentation
- IDS (Implementation Design Specification) – This is the detailed design specification for the asset.

<u>Installation</u> – This consists of three main phases:

1. Install and commission new hardware and base software to applicable architecture and security standards;
2. Install ISIS applications;
3. Engineering configuration and testing to assure correct functioning of ISIS functionality.

<u>Post-Installation</u> – At the end of the installation process ISIS will be a working system, but many of the configuration parameters will need tuning to asset specific conditions. The post-installation process consists of the following key steps.

- Hand over to Support. Transfer responsibility for ISIS support to the IT application support team. A global team was created for support of ISIS for all world wide installations;
- Fine Tuning and commissioning – asset-specific parameters are set and the system is fine tuned to improve results;
- Full handoff to asset team and end-user training.

<u>Long Term Support</u> – The introduction of such a new piece of technology into the hands of asset engineers requires additional support to help them learn how to make the best use of it, to deal with early questions and provide expert advice, and ultimately realise the full value potential. This is done in several ways.

- Provide a central resource of expert petroleum engineers for advice and help;
- Nurture a community of practice amongst end users;
- Provide a Business Transformation offering (Ref Feineman paper) to project manage an approach to realizing value.

## <u>**Experience from Full Scale Deployment of the ISIS Product**</u>:

Testing of the ISIS surveillance tool was completed in late 2005. Wide-scale deployment commenced thereafter and at the time of writing ISIS was operational in 18 fields in several regions worldwide, including the UKCS, Gulf of Mexico, and West Africa, with further projects in progress.

The first wave of deployments showed the importance of the experience gained during testing and also helped develop and refine the key success factors as wider deployment.

<u>Productisation</u> - Productisation is critical to the success of technology deployment at scale. Projects need to be repeatable and the installations and support must be to defined quality standards. The main elements of productisation were:

- Compliance with existing corporate infrastructure standards
- Configuration Management
- Installation Packaging
- Product Support

- Training Materials
- Application support

Engagement and Communications – an effective engagement program is required at all stages of the development and deployment activity. An activity of this complexity has many stakeholders, so it is critical to ensure that all those impacted or whose sponsorship is required are appropriately informed and involved at each stage.

Project collaboration – While the technology development was led by the Technology organization, a joint programme was created between the Technology and IT groups. This brought the right mix of skills to the projects, from petroleum engineering to digital security specialists and led to integrated project planning and execution.

Systems technical integration – Heterogeneity still exists between regional infrastructures in spite of corporate standards. Integration with existing regional networks, PCN's and historians therefore requires access to the technical specialists to diagnose and rectify the problems that will arise during project execution. However it should be noted that having global standards is still key to the success of a wide-scale deployment.

Testing and Commissioning – the ISIS system relies on the engineering configuration being a completely accurate representation of the facilities offshore plus the availability of the data signals collected by certain instruments. It is possible that either could change during the project. Rigorous testing is essential to ensuring the correct operation of the applications and new processes are necessary to ensure future changes in the field are communicated and updates made.

Application Support – Creating a technology for onshore engineers that depends on the systems offshore plus the systems that connect offshore and onshore creates new challenges for support. The systems that serve operations e.g. process control systems, are typically not supported by the corporate IT department that manages onshore infrastructure and networks. Therefore in order to maintain applications using real-time data it is essential to coordinate the relevant support teams and clarify roles and responsibilities. The whole support model for these systems may need re-evaluating.

User Support – For a new technology, the expert user community will initially be small and dominated by those experts closely involved with the development and deployment of the technology. Managing the balance between continuing the development/deployment effort, and supporting what has already been deployed, can be a challenge during this phase. It is therefore key to manage the pace and scale of activities and the resource allocation carefully, whilst trying to encourage the end-user community towards self-sufficiency.

People and process – Realizing the full value from a technology such as ISIS is not automatic. It requires, and we have developed, an integrated approach that holistically addresses diverse issues of technology installation, stakeholder engagement and alignment, business process change, roles and skills as a managed project. We refer to this type of integrated approach applied to digital oil field developments as business transformation (described in outline in Feineman 2006 SPE 99779). An example of successful application in the case of ISIS is described in SPE 112146 Feineman 2008

## Conclusions

Rolling out technologies that integrate offshore real-time data with applications for onshore engineers brings new deployment challenges. First, the technical challenges of integrating with the exisiting systems, which may vary from region to region, must be validated and tested along with the testing of the application itself. Trials and beta tests with assets will provide essential experience and mature the capability for later deployment. For in-house developed software the productisation phase is essential to ensure the applicaiton is robust and supportable prior to wide-scale deployments. Initial deployments should be used to develop repeatable installation and testing procedures.

A real-time information system must be looked at holistically to understand the range of interdependent components and how they interact. This will point to the various groups, skills and resources that will need to collaborate during the deployment phase and for ongoing support.

Providing a new class of data and information that did not exist previously challenges the engineer's accustomed way of doing things. Hence the involvement of the asset management and engineers is critical to achieving buy-in for the change. Engineers need to be involved throughout the project and given adequate training and follow-up support including help to analyse and change working practices, if full value delivery is to be achieved

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